

of the verge, in that the seminal duct orifice is not terminal, and by the long epiphallus. It has a well-developed epiphallic caecum, as in *huasabasensis*. In shell characteristics, it differs by the lack of ascending spiral threads on its embryonic shell and by the persistent periostracal processes on adult shells; such hirsute appearance on adult *Sonorella* shells has been reported only from *S. apache* P.&F. and *S. greggi* W. B. Miller.

S. perhirsuta is known only from the holotype and seven paratypes. The smallest adult paratype measures 13.4 mm. in diameter and the largest 16.1 mm. It lives in the Upper Sonoran life zone among small, granite rock-piles in ravines. Vegetation was mainly *Quercus oblongifolia*, *Q. chihuahuana*, sotol, yucca, coral bean, and a profusion of wild zinnias in bloom. Heavy humus contributed to the early decomposition of dead shells.

A NEW HAWAIIAN CYPRAEA

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It has become apparent through study of recently collected beach and living shells from the Hawaiian Islands that a distinct cowrie has been heretofore overlooked. This cowrie is superficially similar to *Cypraea globulus* Linn. 1758, and *Cypraea bistrinotata* Sch.-Sch. 1937; but it also resembles *Cypraea cicercula* Linn. 1758.

CYPRAEA MAUIENSIS Burgess, new species.

Plate 2.

The holotype is inflated and globular; the dorsum is humped posteriorly, colored tan to pale lemon-pulp yellow, and there is no dorsal sulcus. The dorsum is adorned with tiny discrete elevations, some of which are pigmented, and which are larger, darker and more prominent near the lateral margins and extremities of the shell. There are 3 paired brown dorsal blotches, one pair just above the spire, the second on the mid-dorsum, and the third above the anterior process, and 4 faint brown terminal spots. On the base, at the marginal extremities near the anterior and posterior canals, are 4 faint brown blotches. The extremities are blunt and only moderately produced. The aperture is narrow, slightly curved to the left posteriorly, and does not flare anteriorly. There is a large flat callus above the posterior canal and above this is a shallow depression. The spire is slightly elevated, even in calloused shells, but there is no blotch. The protoconch, when not covered by callus, is transparent. The teeth are fine, and in the mid-columella

are obsolete or absent. There is a distinct labial marginal callus. The anterior extremity is attenuate and pointed; tilting sharply upward but following the contour of the base.

A representative series of living specimens was collected in September, 1963, on a shallow reef at Olowalu, Island of Maui, State of Hawaii. The cowries were found deep in crevices on the under surfaces of living coral heads (*Porites lobata* Vaughn) growing on and firmly adherent to a porous reef in 1/2 to 1 1/2 meters of clear active water.

The mantle is thick, lemon-pulp yellow, and obscures the dorsal pattern of the shell. It is covered with circular gray dots except around the bases of chalk-white 0.5 to 0.75 mm. long fleshy, tapered, beaded papillae which number about 30 to the side. The mantle is also studded with minute circular lemon-yellow spots, which bear flat wart-like papillae; these papillae occupy the spaces between the gray dots and the longer white papillae, giving the tissue a cobblestone appearance.

The tentacles are long (fully 30-35 percent. of the length of the shell), tapered, slender, bright orange-yellow, this color becoming deeper at the tips, and longitudinally striped with gray. The tentacles are placed relatively far posterior on the animal and were never presented at the anterior canal in 9 animals observed for 6-8 hours. When the animal changed direction both tentacles would often be on the same side of the shell.

The eyes are jet black and set almost directly beneath the bases of the tentacles.

The ventral surface of the foot is white; the sides covered with gray spots similar to those found on the mantle but of a lighter shade.

The siphon is bell shaped, fringed completely with 16-18 elongate, tapered, blunt processes which are exactly the same shape (if reversed) as the spaces between them. The siphon extends nearly 2 mm. beyond the anterior canal. The cowrie is active and moves fast for one so small.

I named this cowrie *Cypraea mauiensis* for the Island of Maui, State of Hawaii, where in August, 1963, Mr. Joe Kern of Kahului, collected the first living specimen. The holotype, from Olowalu, Maui (Latitude 20° 48.5' North, Longitude 156° 37.3' West) has been deposited in the Bernice P. Bishop Museum, Honolulu,

Hawaii, and bears the number B.M. 8916.

Paratypes have been deposited in the Academy of Natural Sciences, Philadelphia; the United States National Museum, Washington, D. C.; the American Museum of Natural History, New York; the Museum of Comparative Zoology, Harvard; the National Museum, Manila; the Cambridge Museum of Zoology; the British Museum (Natural History); the Rijksmuseum van Geologie en Minerologie, Leiden; the Institut Océanographique, Monaco; the Universitets Zoologiske Museum, Copenhagen; the Indian Museum, Calcutta; the Western Australian Museum, Perth; the Australian Museum, Sydney; the National Museum of Victoria, Melbourne; the Auckland Institute and Museum; and the Bishop Museum, Honolulu. Additional paratypes have been given to several individuals seriously interested in the *Cypraea*.

Cypraea mauiensis has been previously illustrated by C. S. Weaver in "Hawaiian marine mollusks" 1964, Vol. 2, No. 25, Plate 24, Top Center. It also will appear in "The living cowries," Burgess, Plate 30, Fig. F. *Cypraea mauiensis* so far has been reported only from the Hawaiian Islands. It is found as beach worn specimens in older Hawaiian collections in the Bernice P. Bishop Museum.

The type area is the reef at Olowalu, Maui.

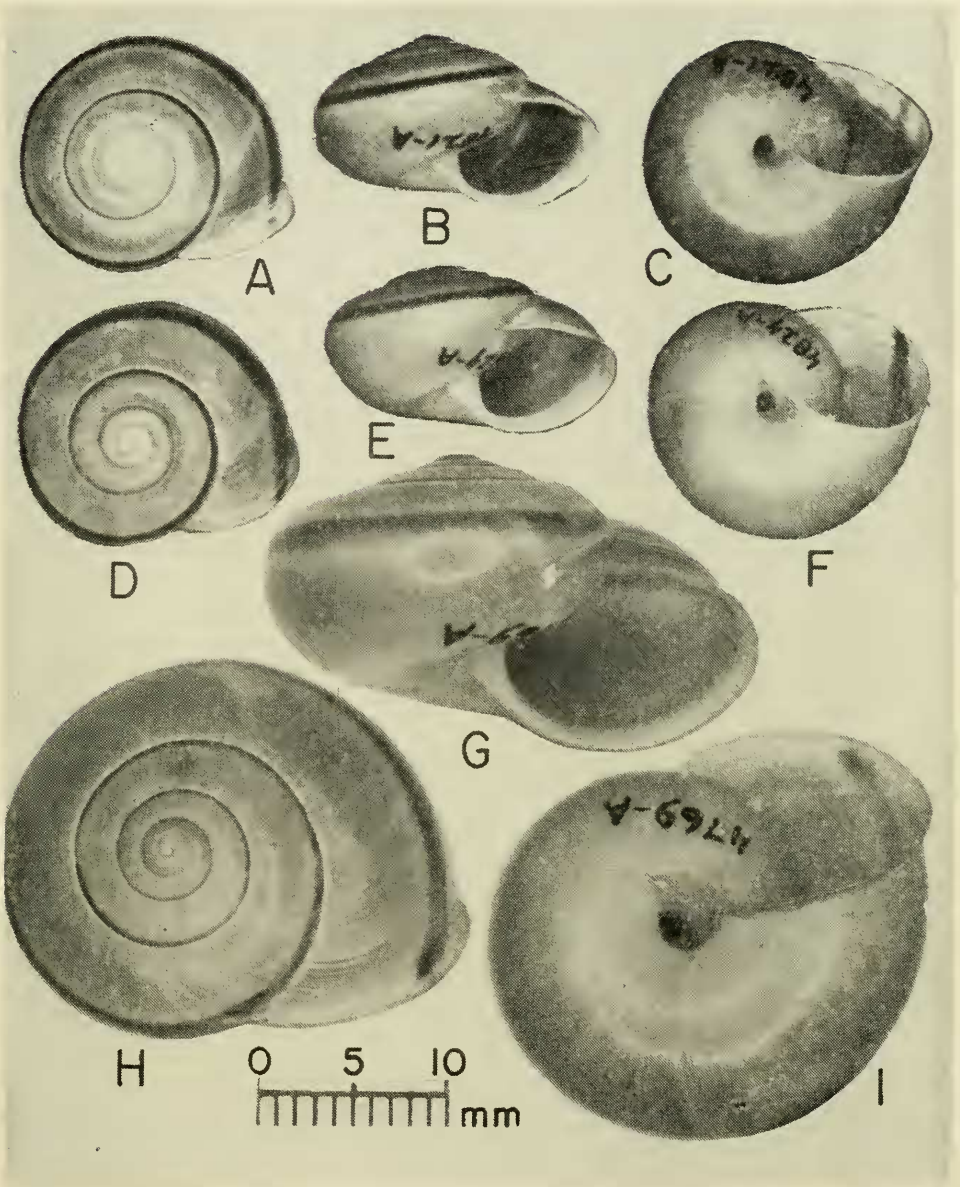
Four species of cowries are now known which are in general globular, with beaked extremities, and light fawn in color. The key below is adequate for separation of these 4 species, but certain other significant differences are usually present.

KEY TO SPECIES

1. Shell macroscopically smooth and glossy without dorsal line or sulcus — 2. Shell obviously pustulate — 3.
2. Sides and extremities of dorsum with elevated and or pigmented pustules visible with low power (2-3x) magnification — *Cypraea mauiensis*. Entire surface microscopically smooth — *Cypraea globulus*.
3. With spire blotch, dorsal sulcus, but without basilar spotting or 3 paired dorsal blotches — *Cypraea cicercula*.

Without spire blotch but with basilar spotting, paired dorsal blotches, and dorsal sulcus or line — *Cypraea bistrinotata*.

In general *C. mauiensis* is smaller, has a consistent pale lemon-yellow color, the extremities are less produced, the anterior proces-



Holotypes. A-C. *Sonorella mormonum huasabasensis* W. B. Miller. D-F. *S. perhirsuta* W. B. Miller. H-I. *S. bequaerti* [to be described fully in Oct. no.].

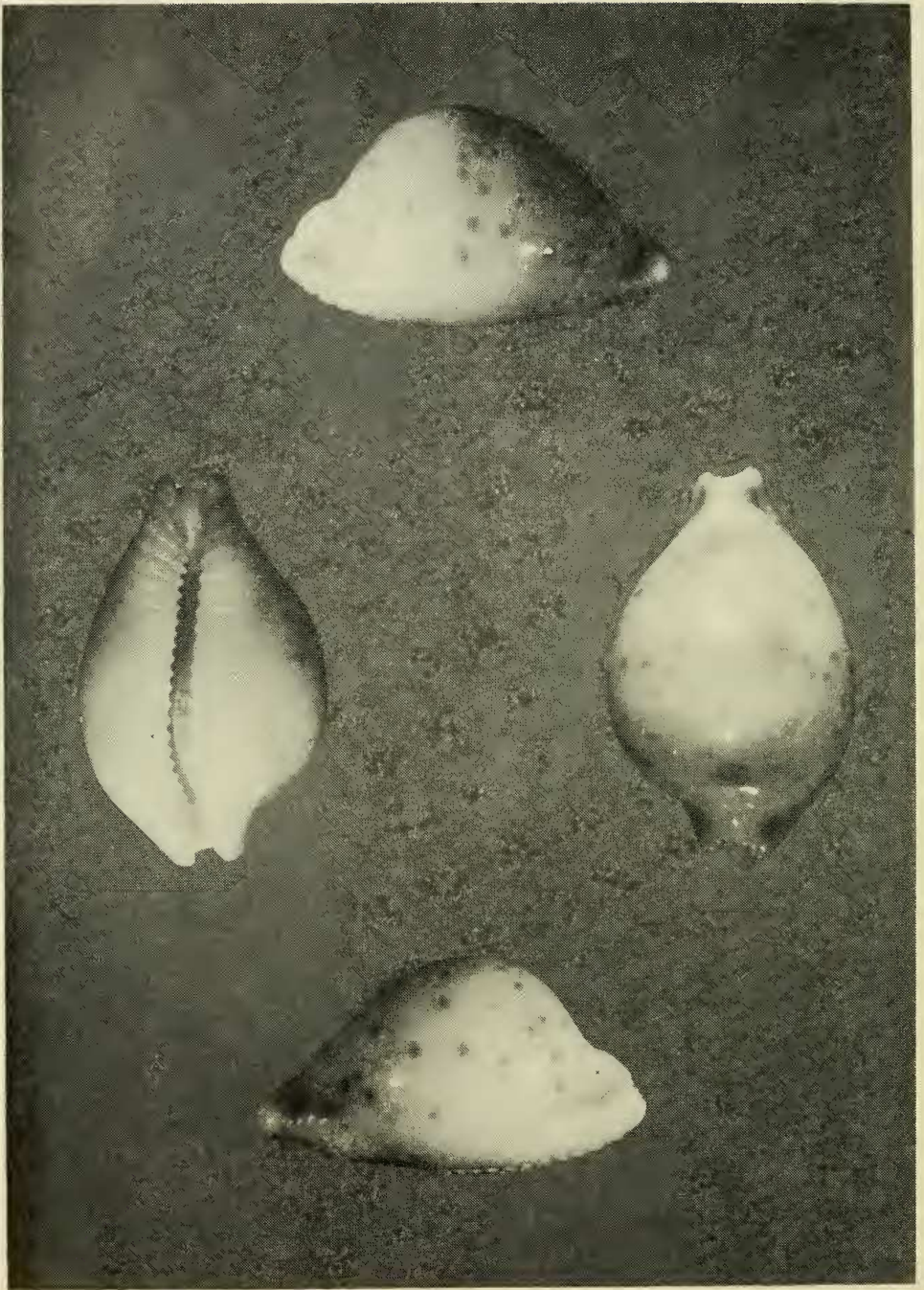


Plate 2. *Cypraea mauiensis* Burgess. Enlarged photograph showing the base, dorsum, right, and left lateral views of the holotype. Actual dimensions in mm.: Length 13.7, width 8.7, height 7.7. Photograph by Gilbert Halpern, Honolulu.

ses more attenuate, the labial marginal callus more prominent and the dorsum more humped posteriorly than in any other of the group. In the specimens measured, the dimensions were found to average in mm.; length 12.38, width 7.94, height 6.87. The largest measured 14.7 x 9.3 x 8.3 mm., and the smallest adult 9.9 x 6.7 x 5.9 mm.

Cypraea cicercula is easily differentiated because of its spire blotch.

Cypraea bistrimontata and *Cypraea mauiensis* are, in certain melanotic specimens of the latter similar on superficial examination. Both may have elevated lateral spotting, 3 paired dorsal blotches, 4 basal spots and attenuate columellar teeth. However *C. mauiensis* is smaller, is lemon-pulp yellow in color (*C. bistrimontata* is golden-brown) and has markedly less produced extremities. The basilar spotting on *C. mauiensis* is present only in about 4 percent, of specimens, and the dorsal blotching in about 75 percent. The basilar spotting on *C. mauiensis* is also placed nearer the edges and extremities of the shell. It can be separated from smooth or beach-worn specimens of *C. bistrimontata* by the character of the dorsal callus which in *C. mauiensis* is wide and flat, the top of which is concentric with the curve of the posterior canal. The callus of *C. bistrimontata* is highly arched or even pointed. The mid-columellar teeth of *C. mauiensis* are attenuate or absent. The teeth of *C. bistrimontata* are nearly always prominent across the entire base.

Cypraea globulus may be easily separated, in adult specimens, from *C. mauiensis* by its entirely smooth shell. The dorsal spotting may be similar, and *C. globulus* may also have the 4 basilar spots and a semblance of the dorsal blotches.

EROTOLOGY OF THREE SPECIES OF PRATICOLELLA, AND OF POLYGYRA PUSTULA

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[Continued from April issue]

The availability of developing young snails of both species permitted a survey of the patterns of genital development in the two species. The sequence of progressive maturation of genitalia in *P. berlandieriana* is shown in figs. 12-17, 7, 9 and 10. In *griseola*